

### REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-10, and 17-22 are currently pending. Claims 17-22 have been added; and Claims 1-10 have been amended by the present amendment. The additions and changes to the claims are supported by the originally filed specification and do not add new matter.<sup>1</sup>

In the outstanding Office Action, the information disclosure statement filed 1/4/2007 was not considered as failing to comply with 37 C.F.R. § 1.98(a)(3) because it does not include a concise explanation of its relevance; Claim 3 was rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter; Claims 1-2 and 4-5 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,617,434 to Tamura et al. (hereinafter, “Tamura”); Claim 3 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Tamura; Claims 6-9 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tamura in view of U.S. Patent Publication Application No. 2003/0128421 to Aiso (hereinafter, “Aiso”); and Claim 10 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Tamura, in view of Aiso, and further in view of U.S. Patent Publication Application No. 2004/0105640 to Hasegawa (hereinafter, “Hasegawa”).

Regarding the information disclosure statement (IDS) filed January 4, 2007, not being completely considered, Applicants note that the reference listed in the International Search Report as “Er Doped Fiber Laser no Noise-like Mode Hasshin to Bunsan Taisei” is titled differently than the reference submitted with the above-mentioned IDS, titled “A Noiselike Operation of an Er-Doped Fiber Laser and its Dispersion Tolerance.” However, it appears that the title has been incorrectly stated on the International Search Report. Applicants

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<sup>1</sup> See, e.g., at least paragraphs [0037], [0041], [0047], and [0070] of Applicants’ specification.

believe that the reference filed with the above-mentioned IDS is the one intended to be referenced in the International Search Report. Thus, a copy of the reference believed to be relevant to the claimed invention was submitted with the above-mentioned IDS. The relevance of this reference to the claimed invention is indicated as “P, X” under section C of the International Search Report.

Accordingly, it is respectfully submitted that the reference titled “A Noiselike Operation of an Er-Doped Fiber Laser and its Dispersion Tolerance,” submitted with the IDS filed January 4, 2007, be considered.

Regarding the rejection of Claim 3 under 35 U.S.C. § 112, second paragraph, Claim 3 has been amended to recite “a nonlinear ratio  $(\gamma_{2L2})/(\gamma_{1L1})$  is larger than 1” instead of “a nonlinear coefficient  $(\gamma_{2L2})/(\gamma_{1L1})$  is larger than 1.” Accordingly, the rejection of Claim 3 under 35 U.S.C. § 112, second paragraph, is believed to have been overcome.

Amended Claim 1 is directed to a fiber laser comprising:

- a normal dispersion optical fiber including a rare earth-doped optical fiber as a gain medium;
- an anomalous dispersion optical fiber; and
- a mode locking mechanism, wherein
- a length of said normal dispersion optical fiber is set shorter than that of said anomalous dispersion optical fiber; and
- an absorption-length product of the length of the normal dispersion optical fiber and a peak absorption value of the normal dispersion optical fiber is greater than 55 dB at a wavelength of 1.53  $\mu\text{m}$ .<sup>2</sup>

Regarding the rejection of Claim 1 under 35 U.S.C. § 102(b), Tamura is directed to producing high energy ultrashort laser pulses using a fiber laser.<sup>3</sup> Tamura discusses that a positive dispersion gain segment may range in length between 0.94m and 1.36m.<sup>4</sup> Thus, Tamura limits a maximum length of the positive dispersion gain segment at 1.36m. Further, there is no discussion in Tamura of a peak absorption value of the positive dispersion gain

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<sup>2</sup> Please note that the discussion regarding independent Claim 1 also applies to independent Claims 2 and 3.

<sup>3</sup> See Tamura, column 2, line 65 to column 3, line 2.

<sup>4</sup> Id. at column 5, lines 65-67.

segment. Thus, Tamura does not disclose that an absorption-length product of the length of the normal dispersion optical fiber and a peak absorption value of the normal dispersion optical fiber is greater than 55 dB, as now defined in Applicants' Claim 1.

Further, the Office Action seems to acknowledge that Tamura does not teach a peak absorption value of the normal dispersion optical fiber, and relies on Aiso for such a teaching.<sup>5</sup> Thus, it is respectfully submitted that independent claim 1-3 (and all associated dependent claims) patentably define over Tamura.

Aiso is directed to providing an optical fiber, which has a large absorption coefficient of Er compared to a conventional Er-doped fiber.<sup>6</sup> Aiso discusses that by co-doping an Er-doped fiber with lanthanum (La), the absorption coefficient of the Er-doped optical fiber can be increased to 32 dB/m.<sup>7</sup> Assuming *arguendo* that the Aiso Er-doped optical fiber (co-doped with La) can be used in the Tamura laser cavity, the maximum length of the Aiso Er-doped fiber in the Tamura laser cavity would be limited to 1.36m, as discussed above. The maximum absorption-length product of the length of such a Tamura-Aiso combination Er-doped fiber is given by

$$(1.36\text{m} \times 32\text{dB/m}) = 43.52\text{dB}.$$

Therefore, the Tamura fiber laser, modified by the Aiso Er-doped fiber, does not disclose that an absorption-length product of the length of the normal dispersion optical fiber and a peak absorption value of the normal dispersion optical fiber is greater than 55 dB.

Thus, even if the teachings of Tamura and Aiso are combined, the combination does not teach or suggest the absorption-length product, now recited in Claims 1-3. Accordingly, it is respectfully submitted that independent Claims 1-3 (and all associated dependent claims) patentably define over any proper combination of Tamura and Aiso.

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<sup>5</sup> See Office Action dated December 8, 2008, page 5.

<sup>6</sup> See Aiso, paragraph [0023].

<sup>7</sup> See Aiso, Table 2 and paragraphs [0105] and [0106].

Amended Claim 4 is directed to the fiber laser according to any one of claims 1, 2, and 3, wherein

a total dispersion of the central wavelength of the output light spectrum in said resonator extends throughout a range of -1 ps<sup>2</sup> to +0.2 ps<sup>2</sup>.

Regarding the rejection of Claim 4 under 35 U.S.C. § 102(b), Tamura discusses that the Tamura laser cavity exhibits a net positive group velocity dispersion, and that the Tamura laser cavity exhibits a group velocity dispersion of at least +0.005ps<sup>2</sup>.<sup>8</sup> Thus, Tamura does not disclose a fiber laser with a total dispersion of the central wavelength of the output light spectrum in said resonator extends throughout a range of -1 ps<sup>2</sup> to +0.2 ps<sup>2</sup>.

Accordingly, it is respectfully submitted that dependent Claim 4 (and all associated dependent claims) patentably defines over Tamura.

Amended Claim 7 is directed to the fiber laser according to claim 6, wherein

a dispersion value in 1.55 μm band of said normal dispersion optical fiber in said resonator is at least 21 ps<sup>2</sup>/Km.

Regarding the rejection of Claim 7 under 35 U.S.C. § 102(b), Tamura discusses that the positive dispersion fiber exhibits a dispersion of at least +0.030 ps<sup>2</sup>/m.<sup>9</sup> Further, Tamura discusses that an estimated value of the Tamura positive dispersion fiber is +0.075 ± 0.005 ps<sup>2</sup>/m.<sup>10</sup> Thus, Tamura does not disclose a fiber laser with a dispersion value in 1.55 μm band of said normal dispersion optical fiber in said resonator of at least 21 ps<sup>2</sup>/Km.

Accordingly, it is respectfully submitted that dependent Claim 7 (and all associated dependent claims) patentably defines over Tamura.

Regarding the rejection of Claim 10 under U.S.C. § 103(a), it is respectfully submitted that Hasegawa does not remedy the deficiencies of Tamura and Aiso, discussed

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<sup>8</sup> See Tamura, column 3, lines 15-27.

<sup>9</sup> See Tamura, column 3, line 24.

<sup>10</sup> Id. at column 12, lines 13-15.

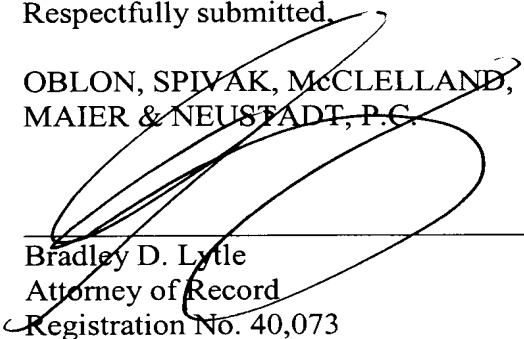
above. Accordingly, it is respectfully submitted that dependent Claim 10 patentably defines over any combination of Tamura, Aiso, and Hasegawa.

The present amendment adds Claims 17 and 18 for examination on the merits. No new matter has been added. It is respectfully submitted that the features of Claims 17 and 18 distinguish from the features recited in Tamura, Aiso, and Hasegawa.

Consequently, in view of the present amendment and in light of the above discussion, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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